

CLAIMS

What we claim is:

1     1.     A multilayered circuit component comprising:  
2             two or more layers;  
3             a first surface of the two or more layers upon which a first plurality of circuit  
4 paths are provided;  
5             a second surface of the two or more layers upon which a second plurality of  
6 circuit paths are provided;  
7             an aperture extending through at least a portion of the two or more layers, the  
8 aperture being defined by a first opening on the first surface, a second opening on the  
9 second surface, and an internal surface of the two or more layers that extends between the  
10 first surface and the second surface;  
11            a first trace element provided over a portion of the internal surface of the aperture  
12 to extend between the first surface and the second surface, the first trace element  
13 extending onto the first surface to form a first partial perimeter of the first opening;  
14            wherein the first trace element is formed by plating a first hole on the first surface,  
15 and then subsequently forming the aperture to intersect the first hole, so that after the  
16 aperture is formed, a remaining portion of the first hole has plating that forms the first  
17 trace element.

1     2.     The component of claim 1, wherein the multilayered circuit component further  
2 comprises:  
3             a second trace element provided over a portion of the internal surface of the  
4 aperture to extend between the first surface and the second surface, the second trace  
5 element extending onto the first surface to form a second partial perimeter of the first  
6 opening; and  
7             wherein the first trace element and the second trace element are formed by plating  
8 the first hole and a second hole on the first surface, and then subsequently forming the

9 aperture to intersect the first hole and the second hole, so that after the aperture is formed,  
10 the remaining portion of the first hole has plating that forms the first trace element, and a  
11 remaining portion of the second hole has plating that forms the second trace element.

1 3. The component of claim 2, wherein the first trace element and the second trace  
2 element each form a pedal shaped support element on the first surface.

1 4. The component of claim 1, wherein at least one of the first surface or the second  
2 surface is a grounding plane.

1 5. The component of claim 1, wherein at least one of the first surface or the second  
2 surface is a power plane.

1 6. The component of claim 2, wherein each of the first trace element and the second  
2 trace element is rounded as it extends on the internal surface of the aperture.

1 7. The component of claim 2, wherein the aperture has an irregular cross-section,  
2 and wherein each of the first trace element and the second trace element is rounded as it  
3 extends on the internal surface of the aperture.

1 8. The component of claim 1, wherein the component forms part of a backplane.

1 9. The component of claim 1, wherein the first trace element has a radius of  
2 curvature that defines a corresponding circle, and wherein the first trace element has an  
3 arc length that is less than 50% of a circumference of the corresponding circle.

1 10. The component of claim 9, wherein the arc length of the first trace element is less  
2 than 33% of the circumference of the corresponding circle.

1 11. The component of claim 2, wherein the first trace element has a radius of

2 curvature that defines a first circle, the second trace element has a radius of curvature that  
3 defines a second circle, and wherein the first trace element and the second trace element  
4 each have an arc length that is less than 50% of a circumference of the corresponding first  
5 or second circle.

1 12. The component of claim 1, wherein the aperture has an irregular cross-sectional  
2 shape.

1 13. The component of claim 1, wherein a cross-section of the aperture is shaped to  
2 have a plurality of different radii of curvatures.

1 14. A multilayered circuit component comprising:  
2 two or more layers;  
3 a first surface of a first layer in the two or more layers, the first surface containing  
4 one or more circuit elements;  
5 an array of apertures extending through at least a portion of the first layer to  
6 extend between the first surface and at least one other surface of the two or more layers,  
7 each aperture in the array having a first opening on the first surface;  
8 one or more discrete trace elements provided over an interior surface of each  
9 aperture in the array, each trace element extending between the first surface and the other  
10 surface of the two or more layers, and each trace element forming a portion of a cross-  
11 sectional perimeter of the aperture which contains that trace element;  
12 wherein each aperture is shaped to receive a corresponding male connector  
13 element that can extend into the aperture and make electrical contact with the one or more  
14 trace elements that are provided in that aperture, so that another layer comprising an array  
15 of male connectors is matable with the component using the array of apertures of the first  
16 surface.

1 15. The component of claim 14, wherein one or more of the apertures in the array  
2 contain one or more trace elements that extend from the respective apertures and form a

3 corresponding pedal shaped support element on the first surface.

1 16. The component of claim 14, wherein one or more of the apertures in the array  
2 contain one or more trace elements that are rounded as they extend into the respective  
3 aperture.

1 17. A multilayered circuit component comprising:  
2 two or more layers;  
3 a first surface of the two or more layers upon which a first plurality of circuit  
4 paths are provided;  
5 a second surface of the two or more layers upon which a second plurality of  
6 circuit paths are provided;  
7 an aperture extending through at least a portion of the two or more layers, the  
8 aperture being defined by a first opening on the first surface, a second opening on the  
9 second surface, and an internal surface of the two or more layers that extends between the  
10 first surface and the second surface;  
11 a first trace element provided over a first portion of the internal surface of the  
12 aperture to extend between the first surface and the second surface, the first trace element  
13 being rounded and extending onto the first surface to form a first partial perimeter of the  
14 first opening;  
15 a second trace element provided over a second portion of the internal surface of  
16 the aperture to extend between the first surface and the second surface, the second trace  
17 element being rounded and extending onto the second surface to form a second partial  
18 perimeter of the first opening;  
19 wherein the opening of the aperture has a plurality of radii of curvatures.

1 18. The component of claim 17, wherein the first partial perimeter of the first opening  
2 has a first radius of curvature, the second partial perimeter of the first opening has a  
3 second radius of curvature, and another perimeter portion of the opening has a third

4 radius of curvature, wherein at least the third radius of curvature is different than the first  
5 radius of curvature and the second radius of curvature.

1 19. A multilayered circuit component comprising:  
2 an array of input/output contact points provided on a first surface of the first layer  
3 of the circuit component;  
4 a plurality of trace element clusters, each trace element cluster extending inward  
5 from the first surface of the first layer to an other surface of the multi-surfaced circuit  
6 component, wherein each trace element cluster includes at least (i) a first trace element  
7 for providing a first connection to one or more current bearing components on the other  
8 surface that the first trace element extends to, and (ii) a second trace element for  
9 providing a second connection to one or more current bearing components on the other  
10 surface that the second trace element extends to; and  
11 wherein at least some of the trace element clusters are positioned interstitially  
12 between two or more input/output contact points in the array.

1 20. The component of claim 19, wherein at least some of the trace element clusters  
2 are positioned interstitially between a set of four input/output contact points in the array.

1 21. The component of claim 19, wherein at least one trace element cluster provides  
2 that the first trace element contacts a ground or power plane.

1 22. The component of claim 19, wherein at least some of the trace element clusters  
2 include four or more trace elements, wherein each of the four or more trace elements  
3 makes a distinct connection with a current bearing component on another surface.

1 23. The component of claim 19, wherein the interstitially positioned trace element  
2 clusters are disposed within the array so that one or more channels for extending escape  
3 lines are formed.